AVIATION

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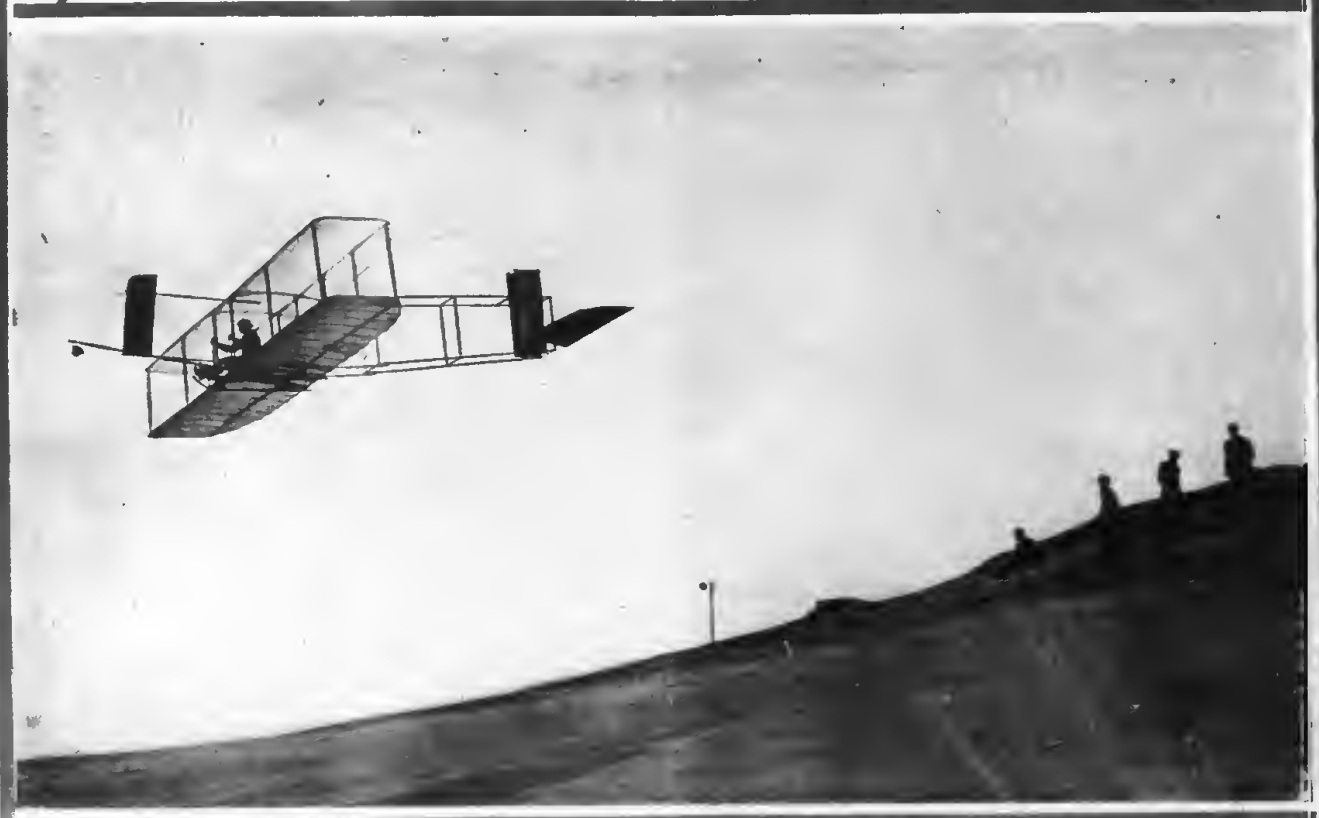

An Historic Flight: Orville Wright Hovering in a Glider near Kitty Hawk, Nov. 15, 1911

VOLUME XII
Number 4

Four Dollars a Year

SPECIAL FEATURES

THE U. S. AIR MAIL SERVICE
NEW GOODYEAR MILITARY AIRSHIP
AERIAL SURVEY OF THE MISSISSIPPI DELTA
CANADIAN TECHNICAL MEMORANDA

THE GARDNER, MOFFAT CO., INC.
HIGHLAND, N. Y.
225 FOURTH AVENUE, NEW YORK

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HIGHLAND, N. Y.

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A Controversial Question

THE history of armament and armor shows either one or the other of the opposing factions constantly to be advancing to keep pace with or supersede its rival. In a narrow sense armor means the protective covering of the target under fire, be it the steel armor plate of the capital ship or the reinforced concrete of the shore battery, it matters little. Similarly, in a narrow sense armament means the ordnance which is to penetrate the armor of the target.

The recent war has resulted in a broader conception of the meaning of these terms, however. Thus any factor contributing to the defense, exclusive of personnel, is armor, and similarly any factor contributing to the attack, exclusive of personnel is armament. As an illustration, camouflage is a form both of armor or armament depending upon the manner in which it is used.

Aircraft have exerted great influence toward this new conception of armor and armament. In previous wars, with the exception of shore battery work, different branches of opposing forces seldom came into conflict. The use of aircraft has changed this by opening up previously closed channels of attacks and defense. Thus we have aircraft combating submarines, bombing cities, and machine gunning troops. The recent war showed aircraft able to attack and defend both the other branches of the service, so that in the future these services will not only have to prepare a defense from their own kind of an opposing force, but also from that dominating kind of the opposing force—the aircraft.

The Air Service is devising schemes for attacking a battle fleet. As sure as a scheme of attack is evolved a scheme of defense will advance to meet it. The logical procedure will be to plan an attack for which a defense cannot easily be evolved. What, then, is the best method of attacking a battle-fleet? Undoubtedly an aerial attack is best. The particular form of aerial attack is open to discussion. Information at present available indicates that bombing is in favor. Whether this is so because it is the best method of attack, or because it is the method of attack best adapted to the material and equipment available is a question.

The vulnerable part of the modern capital ship is below the water line—not so much from a standpoint of sinking as from a standpoint of being put out of action by an explosion which will disarrange appliances connecting lighting, fire control, and many auxiliaries which combine to enable a capital ship to perform its duty.

It seems then that for attacking a capital ship the torpedo should be used in preference to the bomb. The torpedo should be launched from a high speed folding-wing amphibian which will leave its shore base or carrier base, as the occasion demands, escorted by fighting machines. The attackers will approach the target from the windward, and the torpedo will be launched from the cover of a smoke screen previously established by those of the escort designated to do so.

The outstanding advantages this method of attack possesses over the bombing method is that its chances of error are half those of the bombing method. A bomb must be sighted against error both longitudinally and laterally while a torpedo need only be sighted against the former error. Add to this advantage the hidden approach behind the smoke screen—and the superiority of the torpedo attack is complete.

Radio in the Future

FEW people realize the future of radio in all aviation activities. The Block Signal System which has been developed at so much expense of time and money for the railroads, has no counterpart in the air.

Wireless apparatus will have to take care of all this work in addition to ordinary commercial telephone communication from plane to ground and vice-versa. That is to say, a plane in commercial use will be using its wireless apparatus practically all the time when commercial air transportation is fully established. At the present development of the art, this is nearly impossible due to the interference brought into play. Some new invention or development is clearly required in this connection.

Two methods immediately suggest themselves. One would be some form of multiplex apparatus, and the other, directed messages. The first is self explanatory. By the second we mean that the messages being sent out along a certain airway would be directed along that airway and hence would not interfere with other traffic. The method of restricting wave lengths for certain classes of work has nearly reached its limit of usefulness today.

It is hoped that this problem will be solved before the situation becomes really acute.

Congress and the Air Mail

THE decision of the House Appropriations Committee to eliminate from the Post Office Appropriations Bill all provisions for the transportation of mails by aircraft—which would "wash out" the Air Mail Service—hardly comes as a surprise in view of previous instances of hostility of Congress toward air appropriations.

The New York *World* hits the nail on the head when it says editorially that "there seems to be in Congress a strong belief that aviation is some sort of black art or violation of natural law, and that an opportunity must be overlooked to discourage and repress it. It amounts almost to a Congressional superstition that by riding the air man invites the wrath of unseen powers."

Nevertheless the threatened extinction of the Air Mail Service is by no means final, for the two Houses of Congress have yet to make themselves heard on this subject regarding which they appear to need considerable enlightenment.

The United States Air Mail Service*

Brief History Shows Air Mail Pilots Carried Since Beginning of Service 100,000,000 Letters over an Aggregate Distance of 3,400,000 Miles

By Col. E. H. Shaughnessy

Second Assistant Postmaster General

The Post Office Department since its beginning in 1789, may, in my opinion, be justly called the foster mother of safe rapid and regular transportation, not only within the boundaries of our own country, but between this country, and our neighbors near at hand, and those overseas.

From the very first, one of the finest traditions in the Post Office Department has been the continual, persistent effort on the part of its executives to develop, by every possible means, frequent and expeditious handling of the United States Mail.

This work of encouraging good transportation, started way back in the stage coach days, when four-in-hand mail coaches, dashing along the highways, were the pride of the countryside. Then, when the first straggling railways were put into operation, the Post Office Department, true to its tradition with respect to transportation, immediately turned to them as the next logical step in the direction of an efficient mail service. It took courage to do this, because there was a section of public opinion, majority opinion in fact that condemned the new-fangled weird looking railway equipment of that day as not only useless but actually dangerous and not to be tolerated in a well regulated community.

To my mind, it seems but fair to say that the Post Office Department, through its liberal patronage of the railways, from the first down to the present time, has contributed, more perhaps than any other single agency, to the wonderful development that has taken place in this land of ours with respect to fast and frequent passenger train service. The growth of the railway mail service since its inception is worthy of an epic in itself.

The same story can be reported insofar as ocean transportation is concerned. The Post Office Department has kept the American flag on the high seas when all else failed and today is lending most effective support to the splendid work that is being done to reestablish a real American mercantile marine.

I might say in passing, that the privilege of carrying the mail has always been eagerly sought after and charily granted, because the legend "United States Mails," carried at the mast-head of a ship, or on the side of a train or vehicle is a mark of distinction, in fact a certification that the mail carrier is to be trusted in every respect.

Need for Intelligent Study

My purpose in being here tonight, however, is not to deal in generalities concerning transportation, I am here to give this section of the Society of Automotive Engineers specific information regarding the latest venture of the Post Office Department into the transportation field, namely, the Air Mail Service. I assure you that it is a pleasure to do this. We welcome in the fullest sense your consideration of this newest phase of the transportation problem. There is, without question, great need for intelligent study along this line; particularly is there need for wise counsel, not only with reference to the Air Mail Service per se but aviation generally speaking.

In describing the Air Mail Service, please understand that I am speaking from a transportation standpoint, not from a technical standpoint and intend to simply state the facts as they exist letting you draw your own conclusions therefrom.

The Air Mail Service operated by the Post Office Department was started May 15, 1918, the first step being the establishment of a mail route extending from Washington, D. C., to New York City via Philadelphia, no intermediate stops being made. To begin with Army planes and personnel were used. The planes were the JN4H type, equipped with 150 hp. Hispano-Suiza motors, and having a carrying capacity of 150 lb. of letter mail, or approximately 6000 letters.

On Aug. 12, 1918, the Post Office Department, having perfected a civilian organization, relieved the Army from further duty with the Air Mail Service, thereupon assuming full charge of all activities and at the same time putting in use the Standard E4 type plane, equipped with the same 150 hp. Hispano-Suiza motor, but having a carrying capacity of 200 lb. or approximately 8000 letters. The Washington-NewYork route operated steadily and successfully, warranting further expansion, and on May 15, 1919, or one year later, the first leg of the transcontinental route was established from Cleveland to Chicago, via Bryan, Ohio, using the DeHavilland 4 type plane, equipped with the 400 hp. Liberty motor, having a carrying capacity of 350 lb., or approximately 14,000 letters. Further extension followed rapidly. July 1, 1919, service was started from Cleveland to New York City, via Bellefonte, Pa.; May 15, 1920, from Chicago to Omaha, via Iowa City, Iowa; Sept. 6, 1920, from Omaha to San Francisco, via North Platte, Nebr., Cheyenne, Wyo., Salt Lake City, Utah, and Reno, Nev. In addition to the transcontinental trunk route, additional lateral routes were put into operation as follows: Aug. 16, 1920, from St. Louis to Chicago, and on Dec. 1, 1920, from Chicago to Minneapolis.

Criticism in Congress

That was the situation when the present administration took office, that is to say, there were in operation air mail routes from New York City to San Francisco, St. Louis to Chicago and Minneapolis to Chicago over which mail planes were flying regularly during the daylight hours. Great things had been accomplished in the way of extending the Air Mail Service, but, the situation as we found it was not altogether satisfactory. Criticism was being directed toward the service by the public and the Congress, principally due to the fact that there had been a series of unfortunate accidents during 1920, which had resulted in considerable loss of life. In addition to this feature, Members of Congress in Committee and on the floor objected to the manner in which the Air Mail Service had been extended and financed.

To explain this latter point, let me say that Congress alone has the right to designate postal routes and so far Congress has specifically authorized and appropriated for but one air postal route, namely New York City to San Francisco. However, in passing legislation to assist the Post Office Department in developing Air Mail Service, Congress authorized the War Department to turn over to the Post Office Department, surplus aviation equipment and authorized the Post Master General to pay for the operation of same out of the money appropriated for the transportation of mail by railways.

Under this last provision the Air Mail Service has been rapidly extended during the latter part of 1920, the expenditures in connection with such extension being charged, for the most part, to the appropriation for railway compensation which resulted in an embarrassing predicament, putting the incoming administration in the position of being all dressed up and no place to go, because the Comptroller General ruled that while it was perfectly legal to use the railway funds to operate surplus War Department airplanes, planes so operated could not be used in the New York-San Francisco route for which Congress had specifically appropriated $1,125,000; and on the other hand Congress had not authorized any air route other than the New York-San Francisco one.

The whole matter was given very serious consideration. A careful check up indicated that most of the operating difficulties came from too rapid expansion without providing necessary facilities with which to operate efficiently. Then there was the necessity for getting four square with the Committees in Congress so we decided to start a new deal all around; first, to carry out the intent of Congress, which let me say is not unfriendly to an Air Mail Service, simply and very properly unfriendly to what Congress thinks is maladministration in any service, second, to align ourselves with the expressed desire of the Administration for economy; and third, to put into effect my own thought that we would be helping aviation in a much more beneficial way if we stopped the too rapid expansion, which through lack of sufficient facilities seemed to be making the air mail service an extra hazardous occupation and instead concentrate our efforts on standardizing and perfecting the operation on a more restricted route.

Discontinuing the "Laterals"

For these reasons we decided to discontinue the laterals. Washington to New York City was abandoned May 31, 1921, St. Louis Chicago and Minneapolis-Chicago June 30, 1921, which reduced our expenditures at the rate of $675,000 per annum. Today we are only operating the New York City to San Francisco route. It may be interesting to know that while we have materially reduced the mileage in taking off these laterals, our mailplanes are going to fly, for the fiscal year July 1, 1921, to June 30, 1922, at least 1,800,000 miles as compared with 1,760,000 for the preceding fiscal year, this showing being due to increased efficiency in flying performance.

From now on I am going to give you briefly figures and statements to show what the service consists of. Before doing so let me explain that the Air Mail Service as at present operated is used as an auxiliary to the fast mail train service because we do not attempt to fly at night. We hope that within a reasonable length of time the proposed Bureau of Aeronautics in the Department of Commerce will come into being and start the work of marking airways for night flying. When this is done the real value of an air mail service will be at once apparent, for with night flying mail can be put across the continent in less than thirty hours. As a matter of fact, on a test flight on Feb. 22, 1921, the air mail put mail across from San Francisco to New York in 25 hr. and 21 min. actual flying time. This was a notable performance, but altogether too hazardous to be tried again until the way is marked by suitable aides to flying, such as light houses, beacons, etc.

The earliest type of U. S. mail airplane, the Curtiss JN4H (150 hp. Hispano-Suiza), having a mail load of 150 lb., or approximately 6000 letters

The latest type of U. S. mail airplane, Model DHM2 (400 hp. Liberty), developed by the Wittemann Aircraft Corp. from the DH4 Army observation airplane. Mail load, 800 lb.

* Address read before the Washington Section, Society of Automotive Engineers, Jan. 6, 1922.

General

Length of transcontinental route is	2,680 miles
Number of miles flown daily with mail	5,360 "
Number of ships in air daily	21
Average mileage for each ship in air	255
Number of pilots in service	43
Number of other employes	436
Total annual salaries all employes	$787,620
Number of fields equipped with suitable hangars	15

The transcontinental route is divided into three operating divisions. The Eastern Division, from New York to Chicago, is 770 miles long, with headquarters at New York, the Central Division, from Chicago to Rock Springs, Wyo (1125 miles) with headquarters at Omaha, and the Western Division, from Rock Springs, Wyo, to San Francisco (785 miles) with headquarters at San Francisco.

Fields

Air mail Fields are located at the following points Hempstead, Long Island, N Y Bellefonte, Pa., Cleveland, Ohio, Bryan, Ohio, Chicago, Ill (Checkerboard Field, Maywood, Ill) Iowa City, Iowa, Omaha, Nebr, North Platte, Nebr; Cheyenne, Wyo, Rawlins, Wyo, Rock Springs, Wyo, Salt Lake City, Utah, Elko, Nevada, Reno Nevada San Francisco, Calif

In addition to these fields there is an Air Mail Warehouse at Newark, N J, and an Air Mail Repair Depot, Maywood, Ill

Radio Stations

Radio stations are located at headquarters (Washington, D C) and at all fields except Rawlins, Wyo. Navy Radio stations are used jointly at Cleveland, Ohio, Chicago, Ill, and San Francisco, Calif All the other radio stations are owned and operated by the Post Office Department

Employes

	No. Employes	Total Salaries
Headquarters	32	$ 63,070
Warehouse Newark, N J	39	52,550
Repair Depot Maywood, Ill	88	131,350
Eastern Division	126	214,100
Central Division	103	172,850
Western Division	91	155,700
	479	$787,620

Equipment

During the period from May 15, 1918, to Oct 31, 1921, (3 years and 5½ months) 221 planes have been used in the Air Mail Service

Following tabulation shows what has become of them

Crashed and parts salvaged	81
Crashed and burned—no salvage	20
Burned on ground—no salvage	7
Withdrawn—unsatisfactory type—parts salvaged	19
Withdrawn account age—parts salvaged	8
Withdrawn and stored—small type	9
Transferred to Army	1
Available October 31—flying condition	50
Available October 31—undergoing repair	26
	221

Since the reorganization of the Air Mail Service took place last June, great strides have been taken in connection with standardizing and improving the flying equipment From the first a number of different types of planes had been used, principally JN4H, Standard E4, JL's, twin motored DH4, and a single motored DH4 We have standardized on the single motored DH4 and have eliminated all other types This does not mean that the DH4 is the most suitable plane available, it simply means that it is a satisfactory plane for air mail service and good business to standardize on it because the Army has a large surplus which is transferred to our service as needed without expense to us The useful life of the DH4 may be seen from the following record of four such mail planes

		First Trip	Miles flown	Hours	Condition
DeH 4	71	March 9, 1919	55 416	625	Good, still in service
"	99	Nov 15, 1919	64 590	689	"
"	104	Dec 19 1919	58 219	634	"
"	175	Oct. 5, 1920	54,079	547	"

We have in the Air Mail Service at the present time 143 planes, 50 in serviceable condition, 38 being overhauled, and 55 in storage awaiting overhauling

Another item that may be interesting is that during the fiscal year ending June 30, 1921, the Post Office Department paid companies for rebuilding and converting planes the sum of $276,109, and purchased eight planes for $200,000, total of $476,109 00 Since July 1, 1921, no planes have been purchased and all conversion work has been done by our own repair shop at an average cost of $1200 00, and at the same time our situation has materially improved We have today fourteen more planes in serviceable condition than on July 1 last

Organization

The Air Mail Service is directed by a General Superintendent located in Washington reporting to the Second Assistant Post Master General The field service is divided into three operating divisions under the supervision of Division Superintendent located at Hempstead L. I, Omaha, Nebr and San Francisco, Calif Each superintendent has an assistant superintendent to assist in general supervision and local field managers at each landing field In addition to this there is a supply warehouse at Newark, N J, and a repair depot at Maywood, Ill in charge of Superintendents, reporting directly to headquarters as I have stated before

The total number of employes is 479, and the annual payroll $787 620 00 Prior to the reorganization July 1 last, the pay roll carried 521 employes, with salaries totalling $864,321 00

Performance

The operating performance of the Air Mail Service in recent months has been truly remarkable For the first quarter of the current fiscal year, that is from July 1 to Sept. 30, 1921 98 per cent of all scheduled trips were completed By Divisions, the record is as follows

Division	Miles flown	Letters carried	Per cent
New York-Chicago	112 626	3 506 080	98 5
Chicago-Rock Springs	168 805	4 310 760	97 8
Rock Springs-San Francisco	109 [illegible]	3 19[illegible] 520	98

In compiling these figures, trips are not counted unless completed

In addition to the 391,018 miles flown with mail on regular schedule, our records show 49,662 miles of test flights and ferry trips, making a grand total of 440 680 miles flown in the three months.

An exceptionally good record was made on that portion of the route between Cleveland, Ohio, and Chicago, Ill, air distance 335 miles. No mail trips were defaulted from April 29, to Oct. 31, a period of 185 days. During that period, 98,890 miles were flown and 3,271,360 letters carried Our records show that approximately two thirds of all mail trips are made in clear weather the balance in fog, rain or snow

During this same quarter, there were eleven crashes eight of which occurred on Air Mail fields and three at outside points of forced landings Two ships were entirely destroyed, but during the quarter there were no fatalities or injuries to employes on regular mail trips There was however one fatality on a ferry trip On July 16 1921, Pilot Howard Smith lost his life in Ship No 222 on the San Francisco field He was assigned to ferry his ship to Reno and fell from an altitude of 300 ft. when taking off

Casualties

During the period May 15, 1918 to Nov 30, 1921, forty-two and one half months, there have been thirty fatal accidents in the Air Mail Service By fiscal years that is to say from July 1 to June 30 the accidents figure as follows

	Pilots	Mechanics	Other Employes
1917 (1½ months)	0	0	0
1918 (12 months)	2	1	0
1919 (12 months)	6	1	2
1920 (12 months)	13	4	0
1921 (5 months)	1	0	0
	22	6	2

During 1920, using round figures, there was one fatality for each 100,000 miles flown Since July 1, we have had one fatality for 800,000 miles flown.

In my opinion, this very much improved showing comes principally from putting into effect a sensible, businesslike program, using trustworthy men and material, leaving the experimenting and stunting to those who are not entrusted with the United States mails I want to emphasize the fact that since July 1 last, during which time this remarkably fine record has been made by our pilots, DH-4 planes have been used exclusively I cannot say too much at this time in commendation of our Air Mail Pilots, several of whom have flown 100,000 miles carrying mail. Since the beginning of the service, Air Mail Pilots have flown 3,400,000 miles carrying more than 2,500 000 pounds of mail, or approximately 100,000,000 letters No finer class of men or pilots can be found anywhere, individually or collectively than those in the Air Mail Service. It is a pleasure to recognize publicly the work they are doing. They are worthily carrying on the best traditions of Postal Service

Cost of Operation

Statistics have been published regularly showing operation and maintenance costs of the Air Mail Service, which are useful for comparative purposes but have not been truly representative, in my opinion, because the figures shown have not included such items as general overhead expense, permanent improvements, surplus supplies on hand were not charged out until used, planes purchased were not charged to capital account, etc Using the statistics as they have been published, the purely operating and maintenance cost per mile during the quarter ending Sept 30, 1920, was 87 cents, for the same quarter 1921, 71 1/3 cents, a reduction of 15-2/3 cents per mile Without much further delay, we intend to revise the cost of sheet so as to include every dollar properly chargeable to the Air Mail Service The new method applied to the periods just given you would result in a cost per mile of $1 43 for 1920 and $1 04 for 1921, or a reduction of 39 cents per mile operated.

This material reduction in operating cost is chargeable principally to reduced overhead expense, second, to increased efficiency from the personnel, as jobs are thought more of nowadays than for several years past, and third, to economy in purchasing supplies principally gasoline We are successfully operating today on domestic aviation gas whereas formerly the so called fighting grade was used Cost per mile means nothing unless translated into ton mile figures. Taking the last figures quoted you, which are truly representative we find that last year the DH4 plane carrying 350 lb of mail was operated at the rate of $8 00 per ton mile. This year the same plane carrying the same load costs at the rate of $6 00 per ton mile, however, we have recently put into service an improved DH4 with the load carrying capacity increased to 800 lb, an increase of over 100 per cent in utility with no additional operating cost In fact this is identically the same plane merely re-designed, which will bring the ton mile cost down to $2 00, a remarkable reduction over the figures of a year ago No doubt private enterprise can do much better than this because, as you gentlemen well know, the Liberty motor is expensive to operate Our justification for using them is that they are surplus stock in the War Department and cost us nothing

Policy

In conclusion, just a word as to the future policy of the Post Office Department with reference to air mail service. The Department, true to its tradition, wants air transportation of the mail because in that direction lies rapid transit. Whether it be heavier-than-air or lighter-than-air types of carriers is unmaterial if the service given is reliable and speedy The Department, however, does not feel that it should operate an air mail service any more than it should operate a steamboat service or a railway service only until such times as the commercial interests, of this country, are ready to step in and take over the burden.

We are willing and eager to cooperate to the fullest extent in assisting real commercial aviation, not by any possible chance to enter into contracts with companies or individuals in the prospectus stage who want to use the legend "United States Mails" to sell stock, but with those having ships in the air ready to load the mails. How soon that time will come, we, of course, do not know, but let us all hope that it will be soon and collectively do everything we can consistently to advance the date, because, after all, there are other important uses for airplanes aside from carrying commerce This country of ours still needs the sort of protection that airplanes and airships and air men can give

Consolidated Statement of the Performance of the U. S. Air Mail Service—Fiscal Year 1921 (July 1, 1920 to June 30, 1921)

Month	Trips Possible (Scheduled)	Trips Attempted	Trips Defaulted	Trips Uncompleted	Weather Encountered: Trips in Fog etc	Weather Encountered: Trips Clear	Mileage Possible (Scheduled mail trips)	Miles travelled with mail	Miles Travelled Testing, Ferrying etc	Total Miles Travelled	Per cent of Performance	Mail Carried * (lbs)	Cost of Service	Forced Landings due to: Mechanical	Forced Landings due to: Other causes
1920															
July	260	[illegible]	7	[illegible]	40	213	11 500	82 140	4 862	74 002	90 30	06 431	$ 85 203 50	25	14
August	368	347	21	18	55	292	78 502	78 456	42 597	112 073	92.42	73 148	73 326 88	39	29
(Transcontinental service inaugurated September 8)															
September	906	[illegible]	194	10	390	112	143 822	105 847	26 355	132 202	70.84	81,180	108 751 79	47	30
October	750	[illegible]	157	37	190	409	154 700	123 274	31 212	154 486	73 09	89,541	128,918 09	54	50
November	758	573	185	77	220	345	159 079	114 750	25 009	139,759	73 83	97 302	121,561 18	85	69
December	884	662	222	105	347	315	178 779	127 306	3 734	131 040	71.21	89,942	191 205 99	88	188
1921															
January	850	697	153	[illegible]	253	444	171 900	132 079	9 980	139 809	77 18	84 495	199 495 91	117	131
February	782	660	122	71	310	350	159 228	130 431	13 224	143 955	81 90	98 135	101 845 43	92	132
March	918	871	47	[illegible]	351	520	185 852	171 593	15 032	186 625	92 42	110 117	152 442 37	64	128
April	984	887	47	[illegible]	378	497	178 7[illegible]8	171 159	15 794	166,950	95 73	117 779	147 805 64	79	107
May	850	833	17	[illegible]	320	513	171 900	198,207	12 810	181 219	97 98	115 073	125 754 74	72	81
June	832	829	3	10	268	562	168,038	166,856	19,195	185,091	99 00	105 938	137 479 83	57	51
Totals	8 833	7 659	1 179	316	3 124	4 595	1,819,279	1,554,955	215,973	1 770 858	85 98	1 120 852	$1 468 009 62	810	954

Regular service between Omaha Nebr., and San Francisco Calif (Part of the Transcontinental Route)—started Sept 10 1920

Service between Chicago Ill and St Louis Mo (part of the Twin Cities (St Paul and Minneapolis) St Louis Division) started Aug 16 1920

Regular service between Chicago Ill and Twin Cities (St Paul and Minneapolis) (part of the St Louis Twin Cities Division)—started Nov 29 1920

New York Washington Division was discontinued May 31 1921

St Louis Twin Cities Division was discontinued June 30 1921

Repair Depot, Bustleton Pa was consolidated with Chicago Repair Depot June 30, 1921—Bustleton field abandoned same date.

Unusual Balloon Flight over Manila Bay

Sailing across Manila Bay in Half Submerged Basket of Partly Deflated Kite Balloon Teaches Several Valuable Lessons

Floating in Manila Bay for over two hoare in an almost submerged basket, with a half-inflated balloon acting as a sail and dragging the basket through the water at the rate of about ten miles an hour was the exciting experience of a party of three aeronauts who attempted a free balloon flight from Corregidor Island to Manila

Sailing an Old Kite Balloon

An interesting raport covering this flight has just been received from Lieut. W. A. Gray, commanding officer of the 27th Balloon Company, stationed at Kindley Field, Fort Mills, P. I., who was the pilot of this balloon. The equipment used for this flight was an old leaky Type R balloon, which had been condemned as unserviceable for observation purposes, and a basket equipped with Kapok flotation rings. The purpose of the free balloon flight was to give the observers practice both in handling and landing a Cacquot type balloon in case of an accidental breaking of the cable.

In about a ten mile breeze blowing toward Manila, the balloon "weighed off" at 9:25 a. m., with twelve bags of ballast, the crew, in addition to Lieutenant Gray, the pilot, being Warrant Officer R. E. Lassiter, aide, and Captain I. H. Edwards, 2nd Aero Squadron, passenger. When about five miles from Corregidor, the wind died down entirely and numerous clouds were encountered at an altitude of 2000 ft. Whenever a cloud would pass over the bag and cool the gas—in addition, the cooling effect of the water at an altitude of 600 ft had also to be considered—the balloon would then descend rapidly, necessitating using ballast. Approximately, after five minutes of cloud the sun would appear and the balloon would then ascend rapidly until the automatic valve would function, thus causing the bag to again descend to where some other clouds would be encountered, causing further descent. It seemed impossible to get and maintain an equilibrium, which was possibly due to the weather conditions, the automatic valving and the porous fabric of the balloon. In addition to this, more ballast was used than actually necessary, due to the fact that the only instrument used was an altimeter, which was at least 200 ft. slow in registering.

About an hour and a half after the beginning of the flight the balloon was in the middle of Manila Bay, some eight miles north of Corregidor, and it was seen that the ballast would not hold out much longer. Preparations were therefore made for coming down in the Bay. The inside lining of the basket was ripped out, in order that when landing the water would not force it up and throw the passengers out. Meanwhile, the occupants of the balloon undressed. After two hours and fifteen minutes in the air, and with only one bag of ballast remaining, the balloon slowly descended and the basket landed in the water. The drag rope, weighing about 60 lb., was still rolled up and tied to the basket, but as soon as the basket hit the water it was cut off altogether. No sooner was this done than the balloon began to ascend again. The valve rope was pulled, stopping the ascent when an altitude of 400 ft. had been reached. Again the balloon descended and with the remaining bag of ballast an excellent landing was made. The balloon still had a large quantity of hydrogen, only the tail being in the water, and, as there appeared to be no danger of it falling and enveloping the basket, the rip panel was not pulled. The water meanwhile was within a foot of the top of the basket and just below the flotation rings, but it was apparent that the hydrogen remaining in the top of the balloon was what actually kept the basket afloat.

The Rescue

It was fully believed that the plight of the balloon could be easily seen from Corregidor, so that no anxiety was felt for the first forty minutes. When, however, no boat was seen leaving the island, it began to appear as though no help was to be expected from there. There were several small fishing smacks about a quarter of a mile from the balloon, and although repeated signals were sent to them they did not respond. After about an hour and a quarter of aimless drifting, a breeze blew up, and the half-inflated balloon acting as a sail began pulling the basket through the water at the rate of about ten miles an hour. When the basket began moving, one side of it went under water, but all concern as to safety vanished, for with the wind holding out it was only a question of time before Manila would be reached. After being in the water about one hour and fifteen minutes, a boat was seen to leave Corregidor, and one hour later, or at about two o'clock, this boat picked up the balloon, basket and passengers, fifteen miles from Corregidor.

The results of this flight were more valuable than if Manila Bay had been crossed and land reached, as it proved that there is not any danger in a balloon of this type falling on the basket when landing in water and that, so long as any hydrogen remains in the bag, it should not be ripped. This flight also demonstrated that when flying at this station baskets should be without an inside lining and should be equipped with flotation rings, or life preservers, and two straight bladed knives.

Summary of Canadian Aviation Certificates and Licenses Issued, Cancelled, Renewed and Still in Force Issued Dec. 31, 1921, by the Air Board, Ottawa, Canada

TYPE OF CERTIFICATE OR LICENSE	Applications Refused.	Now Issues	Lapsed, Suspended or Cancelled	Renewals or Reinstatements	In force on Dec 31, 1920	Applications Refused.	Carried Over in Force From 1920	New 1921 Issues	Lapsed, Suspended or Cancelled	Renewals or Reinstatements	1921 Issues In Force On Dec 31/21	Total in Force On Dec 31/21
	1920					1921						
Private Air Pilot's	Nil	85	Nil	Nil	85	Nil	85	10	81	20	4	89
Commercial Air Pilot's	1	85	11	85	85	Nil	85	75	108	101	44	61
Air Engineer's	5	87	4	Nil	83	Nil	83	110	15	1	108	178
Air Navigator's	Nil	Nil	Nil	Nil	Nil							
Airship Officer Pilot's	Nil	Nil	Nil	Nil	Nil	Nil	Nil	1	Nil	Nil	1	1
Registration of Aircraft						Nil	Nil	1	Nil	Nil	1	1
Civil Aviation M/cs	1	71	10	Nil	61	Nil	61	16	29	1	19	55
Civil Government M/cs	Nil	13	Nil	Nil	13	Nil	13	26	3	Nil	21	38
Can. Air Force M/cs	Nil	46	1	Nil	45	Nil	45	23	9	Nil	17	62
Airharbor Licenses												
Civil Aviu. Airharbors	3	35	1	Nil	32	Nil	32	8	18	Nil	7	34
Civil Govt. "	Nil	4	Nil	Nil	0	Nil	4	3	1	Nil	3	6
Can. Air Force "	Nil	1	Nil	Nil	1	Nil	1	Nil	Nil	Nil	Nil	1
TOTALS —	10	468	27	23	375	Nil	375	278	286	123	219	475

Note Figures include all certified Air Board employes

New Goodyear Military Airship

Nonrigid of 180,000 cu. ft. Capacity and Low Aspect Ratio to have Geared Propellers Driven by two 135 hp. Aeromarine Model U6D Engines

By H. T. Kraft

Chief Aero Engineer, The Goodyear Tire & Rubber Co

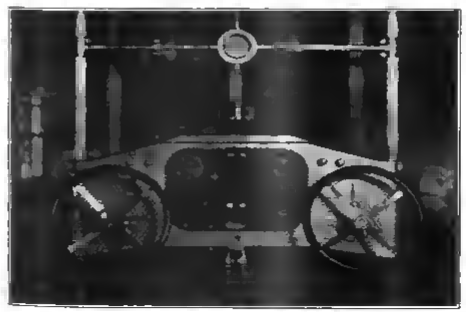
The envelope of the new military airship being built for the U. S. Army is of the Pony Blimp shape, having an aspect ratio of 3.6 to 1. While there has been considerable question as to the head resistance of a large diameter ship, the entire absence of tail droop and the maintenance of a perfect streamlined shape on non rigid ships, are items which are usually overlooked, and are important factors in reduction of resistance of an envelope, apart from the fact that there is a tremendous reduction in skin friction due to the short length of the hull. From a dynamic standpoint, ships of a short aspect ratio have been considered somewhat unstable, but there again, the high static stability due to the low center of weights, of course, is not represented in wind tunnel tests on the model of the envelope itself. A ship of this type should be equally as stable in view of this condition as any airship of this capacity built in the past. The envelope and the car are faired together with an elastic fabric immediately below the envelope, making the entire ship a well streamlined body.

There is a very large saving in surface weights of the envelope proper, in this particular unit reducing weights over 1000 lb. With that, of course, goes the reduction in diffusion, which should be about one-sixth less than for ships of the same capacity built in the past. There should be no surging of the ballonet, due to its particular design, wherein the base line attachment to the envelope is greater than its lateral area, it being impossible for the ballonet to travel beyond this fore and aft base attachment point.

The Car

The car is of the enclosed type, with two longitudinal sills 18 in. deep which constitute the backbone or principal strength-ening members of the structure. The balance of the car is simply a shell, housing the crew, and permitting a closed car to be built of approximately the same weight as any open type of car constructed in the past.

While the development of airships in the past has necessitated the adoption of various instruments, they were usually attached as an afterthought in a rather makeshift arrangement, but before attempting the construction of this unit, we formulated plans so that the control of the airship would be entirely unified. The control board (Fig. 1) carries every



Control station of the new Goodyear airship built for the Army Air Service

The power plant and propeller transmission of the new Goodyear Army airship

instrument that is required for successful lighter-than-air navigation, and is set in the car in such a manner as to permit all instruments to have the highest degree of accessibility. The pilot controls the entire transmission, clutches, reverse device, etc., from the navigating cabin.

The engineer is located in a separate cabin to the rear of the car, with an instrument board for reading all pressures and temperatures of the engines and transmission assembly. The mufflers are of the dual type, in which a part of the air which is delivered to the ballonet is circulated around the exhaust chamber and then into the exhaust itself, to assist in muffling the exhaust noises.

Water ballast is carried in the floor of the car immediately below the navigating cabin, wherein a dial is located to indicate the amount of water available for ballast. The fuel tanks are located in the rear part of the navigating cabin, in two 160-gal. tanks, so constructed as to permit them to be used as sleeping cots in case of long flights. Provisions are made for a crew of seven.

All suspension cables run to the floor of the car, thus permitting veneer sides of 3/32 in. thickness to be used. As all loads are concentrated at the floor line, the surge of the car while in flight is resisted by two lateral cables and four longitudinal cables attached to the center bulkhead. This, in addition to martingales which are also attached to the floor line, have proven very successful in overcoming the surging fore and aft such as is usually experienced when a car is hung too far away from the hull. The disposable load is located directly under the center of volume of the ballonet, thereby permitting a single ballonet to be used without any possibility

of getting out of trim, irrespective of the loads carried within the car.

The Engine Transmission

In going over all the data we could secure on transmissions built in the past, we well realized the problem that confronted us as there had been so many failures along this line. The outstanding difficulties that were experienced with transmissions built in the past were heating up of the oil and excessive vibrations due to torsional reactions, also the transmission getting out of step with the motors, causing excessive gear noise. In closely scrutinizing the construction of other gear drives, we found that the principal defects were the entire lack of unit construction, wherein the designer depended upon struts or other connections to the car or fuselage, and in the case of airplanes, attachments to the wing struts, which, of course, made it quite obvious that trouble would be encountered.

In laying our plans for the Goodyear transmission, our first thought was to make the entire assembly one integral unit, wherein the clutches, couplings, gears, shafts and propeller gear housing would be built together in the most direct manner. It was largely on this basis that the success of the transmission was assured. We next analyzed the gears of several different types of transmissions and found that the tooth profile was bad, and in view of using straight bevel, trouble was experienced in perfect cutting of the teeth, which resulted in excessive gear noises.

The Goodyear transmission was designed with spiral bevel gears in which considerable experience was available, in view of their popular use in the automobile industry. The teeth were 4-5 pitch 30 deg. tooth angle, and were made by the Gleason Gear Works of Rochester, N. Y. We found that in making the preliminary test run on a dynamometer that there was an entire absence of any gear hum, and while this dynamometer test forced us to allow two gears to idle in the case, we experienced very little heating up. To get an absolute percentage of efficiency of this unit, in the airship itself, we constructed a large wooden stand upon which were mounted two Aeromarine 135 hp. type U-6 D motors, connected thereto being two clutches of the multiple disc type, manufactured by the Twin Disc Clutch Co. of Racine, Wis. Couplings between the clutches and the transmission were of the flexible type so designed as to take some degree of misalignment and angularity.

While theoretically this unit is in perfect alignment, the couplings were inserted to absorb any misalignment that might occur due to the weaving of the car proper. The transmission tube, which is one complete unit, is held on the cross sills by eight bolts at the outer edge of the car. A test load of 1000 lb. was hung on the propeller tip with a deflection of only 0.098 in. We were thus assured that a propeller which weighs but 80 lb. would not cause any excessive bending movement on this tube. Also, the thrust of the propeller which is approximately 700 lb. has a theoretical factor of safety of 8. The tubes were cast by the Aluminum Manufacturers, Inc., of Cleveland, Ohio, and were produced of their No. 195 metal, heat treated, having an ultimate strength of 40,000 lb. per square inch, or approximately twice that of plain cast aluminum. The elastic limit of this metal is 30,000.

Tests of Propellers

The propellers were attached and all necessary clutch adjustments were made before the motors were started on the stand run. We found that at half power, with both motors, the tubes were absolutely steady, and there was an entire absence of gear noise, and at half power the oil temperature only rose 5 deg. above room temperature. It had been our thought to apply the power gradually, but we opened both motors wide, and both tachometers indicated 1550 r.p.m., giving a propeller speed of 775 r.p.m. This being a static test, the propellers would go up to their design speed, of 800 r.p.m. while in flight. The motors were left open for three hours, at which time the center gear box showed a temperature of 75 deg. F. or 13 deg. above the room temperature, which, of course, for a transmission of this type is quite remarkable. At this speed and during its entire operation, there was not the slightest sign of vibration of any nature, and an entire absence of noise, gear hum, or any mechanical troubles that would indicate improper design. An additional run of 10 hr. was completed without the necessity of making any adjustments on the transmission.

While the preliminary drawings and general arrangement were laid out by the aeronautical design division of the Goodyear Tire and Rubber Co., the entire detail design and production of the transmission was put in the hands of John Ruse, chief engineer of the Tractor Division of the Wellman-Seaver-Morgan Co., whom we credit with the remarkable success of the transmission unit.

The weight of the transmission without propellers was 593 lb. The blowers and clutches weighed 88 lb. This is just slightly greater than the weight of outriggers on some of the airships built in the past.

Engines Mounted in Car

The transmission driven airship permits the motors to be placed within the car, thereby making them very accessible and in the case of nonrigid and semirigid airships, permits Sirocco type fans to be attached directly to the motors, thereby permitting the elimination of scoops, which offer considerable resistance and add considerable weight. It permits any mechanical adjustments to the motors, and in the case of the above unit, a complete cylinder head could be removed while in flight. As the heating up in any transmission is a direct indication of power losses, due to the entire absence of this trouble in the Goodyear type transmission, it is conservatively estimated that an efficiency of 98 per cent is obtained. Due to the fact that the propellers are 11 ft. in diameter, and have a pitch of 10 ft. 6 in., and also due to the reduction of head resistance and the absence of protruding members, there should be a considerable gain in the speed of the ship.

In view of the unit arrangement of the transmission a reverse gear was inserted, which permits the propellers to be reversed without difficulty. The tractor type propellers were so arranged as to permit the edge of the tube to be streamlined. The radiators are to be set on bosses located on the tube, thereby placing them directly in the ship stream. The tractor type propellers offer the advantage of safety by keeping all these mechanical parts to the rear of the blade.

Characteristics

The characteristics of the airship are as follows —

Capacity	180 000 cu. ft.
Length	170 ft.
Diameter	48 ft.
Speed	60 m.p.h.
Rate of Climb	1000 ft. per min.
Rate of descent	800 ft. per min.
Cruising radius full throttle	14 hr.
Cruising radius reduced throttle	20 hr.
Percentage of useful load	80
Crew	7

While this airship is an experimental one, it has proven that with the enclosed car, transmission, reverse feature and two additional passengers, it is a decided improvement in the nonrigid type of airship. Ships of this design could be constructed up to 300,000 cu. ft. capacity without the slightest difficulty. The entire design adapts itself to the insertion of a rigid keel, which would permit ships up to at least 1,000,000 cu. ft. to be built, with a tremendous saving in the structural weights, and with an assurance of a very high percentage of useful lift.

Aeronautical Chamber of Commerce

The following additions to the membership list of the Aeronautical Chamber of Commerce of America, Inc., published in Aviation for Jan. 2, 1922, have occured:

Membership Class (A)—Airship Manufacturing Co. of America, Hammondsport, N. Y.

Membership Class (C)—Beckwith Havens, Airship Manufacturing Co. of America, Hammondsport, N. Y.; C. C. Witmer, Airship Manufacturing Co. of America, Hammondsport, N. Y.; C. M. Manly, New York City.

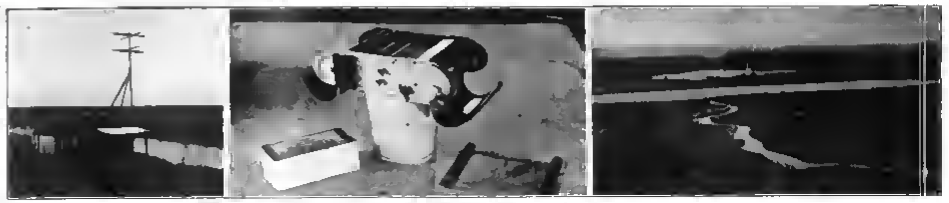
Membership Class (B)—B-G Corp., New York City; American Hammered Piston Ring Co., Baltimore.

Aerial Survey of the Mississippi Delta

One of the Biggest Undertakings of Civil Aerial Photography Recently Brought to Successful Conclusion

By S. R. Winters

Flying at an altitude of 8,000 ft., circling over the wild-cane brakes of the delta of the Mississippi River, taking 1,000 photographs of a marshy area 18 miles long and 15 miles wide—briefly, such is the story of the biggest undertaking of aerial photography as a peace-time venture. The art of reproducing land and water objects from an airplane was first given impetus by war-created difficulties in determining military features of enemy-occupied territory. From these achievements has developed the program of mapping from the air the entire Atlantic and Pacific Coasts. The Coast and Geodetic Survey of the United States Department of Commerce and the Army and Navy Air Services are jointly to assume the responsibility of executing the contemplated plans of surveying waterways through the lens of the camera at sky-climbing altitudes.



Left: Signal used for control point in the survey—Center: K-1 mapping camera—Right: Section of Mississippi delta, showing numerous small lakes and bayous

The Section Completed

The recent completion of a topographic survey of the southern portion of the delta of the Mississippi River marks the first pretentious effort of the Government to employ airplane photography as an instrumentality in charting the "lay of the land" or denoting changing shore lines of waters. The only previous attempt, incomparably feeble to the undertaking being described, was that of March, 1920, when the Army Air Service photographed the coast line of New Jersey from Cape May to Seabright. A single flight was made, consuming barely two hours. Two rolls of films were engaged yielding a total of 183 photographs. The films were developed in two days, and their interpretation, assembling mosaics, comparison with topographic sheets, and reduction to the scale of the chart of the outside shore line involved fifteen days' work of an engineer. As far back as July, 1919, an experiment was projected in the vicinity of Atlantic City for determining the fitness of airplane illustrations for mapping the superficial features of an area. The project was successful, and the prints snapped while the cameraman was soaring in mid-air are being employed in revising the charts of the New Jersey coast.

The soggy Mississippi delta and its inaccessibility are characteristics commonly identified with its topography. The surveyor had been denied admittance to its sequestered corners, save when approachable by boats. Some of the territory had not been included in the comprehensive charting of the Coast and Geodetic Survey—only, perhaps, in a general way in the absence of specific surveying. Conditions for airplane surveying were, however, pleasing—a flat country. The chief obstacle encountered, allowing for the skill necessarily involved in such a difficult job, was the unfavorable weather which interrupted continuous operations. Visualizing land and water objects at a height of 8,000 ft. specifies clear days, when clouds, smoke and foggy skins are charitable enough to spare time with the aerial photographer. This element of chance scattered the efforts in obtaining 1,000 pictures over a period of two months. The operating crew consisted of a photographer, aviation pilot, and a force on land for replenishing fuel and repairing the airplane engine.

A K1 mapping camera, designed by the Eastman Kodak Co. for the specific object of surveying from the air, was committed to service. The visualizing-instrument contains a film 75 ft. long and 10 in. wide, yielding ninety pictures from each roll. The camera was fixed rigidly in the machine. The ground control was under constant supervision of an officer of the Coast and Geodetic Survey, a special target being constructed as a relief for properly locating the position of the photographs on the chart. The experimental project of surveying from the air at Atlantic City in 1919 introduced into service three types of cameras—the "L", "Trilens," and "K-1". The aerial photography in the Mississippi delta subscribed to the suitableness of the latter instrument. The prints are 18 by 24 centimeters in size, and the approximate scale is 1-8000. Special equipment is required for developing the films, owing to their extreme length.

The finished photographs are mounted in strip mosaics—not over four feet in length—in the interest of convenience. The length, however, may be determined by the position of control points. This composite picture is compared with the topographic sheet of the Mississippi delta area and the identity of the control points established. Having determined the scale of the photographic mosaic, the use of an instrument described as a "pantograph," the imagery as harvested from an airplane, is reduced to the scale of a chart and transferred from the photographs to tracing paper. The use of the pantograph is essential when the photographs are taken at varying heights. The work just described resolves itself into the technical designation of *aerial phototopography*—a mapping of the superficial features of waterways and land objects without regard to a study of the contour of objects. Flat areas—a country with low relief—only lend themselves to aerial photography in topographic surveys. Mapping mountainous regions successfully will have to await the development of other methods than those now employed.

Aerial Photohydrography

Aerial photohydrography—a method of determining the depth of water, outlining channels, banks, and shoals, as well as locating the dangers of navigation—has not proved success-

ful in practical demonstrations. An investigation was pursued at Key West, Fla., to determine the efficacy of airplane pictures as an instrumentality in conducting hydrographic surveys. The ultimate hope of the undertaking was to eliminate the wire-drag work in the clear waters of the Florida coast. The Naval Air Service employed a variety of cameras in attempts to visualize coral heads and pinnacle rocks, dangers lurking in the pathway of navigators—a menace which involves the use of a wire-drag. Photographs were taken at heights varying from 200 to 4,000 ft., under different light conditions. A well-surveyed area near Key West was selected, and two vessels plied on parallel courses at full speed. The inclusion of the vessels in the pictures was designed as a problem of control. The plane flew forth and back over the course. The courses and positions of the vessels were recorded as in common sounding work. The photographer in the plane noted the time of each exposure, with such data as altitude, plate, filter, etc. Each photograph was subsequently mounted by plotting the positions of the vessels at the instant the exposure was made. The results of the experiment elicited this expression from R. Lester Jones, director of the Coast and Geodetic Survey:

"These experiments proved very conclusively that photographs from the air, using present-day equipment are of little practical value to the hydrographer. While any of the underwater features did appear in the photographs, contrast in color was the most prominent, with no indication as to whether the contrast indicated shoal or deep water. Varicolored bottom, of uniform depth, appears in the photograph as apparent difference in depths. Many charted shoals are not indicated in the photographs, while adjacent ones show clearly. Taken altogether, the results are so unimportant that the chances of eliminating field work in hydrography are very remote. Developments in the art of photography may change this viewpoint."

More Aerial Surveys to Be Made

Meanwhile the Coast and Geodetic Survey continues negotiations for the mapping of waterways and interior surveys from the air. Requests have recently been placed with the Army and Navy Air Services for the undertaking of the following specific projects: Along the Atlantic coast from Winyah Bay to St. Augustine, Fla., embracing 4,300 square miles, a completion of a total of 1,200 square miles in the delta of the Mississippi River, Jamaica Bay, New York, an area of 160 square miles, James River, Virginia, 200 square miles, from Cape Henlopen to Cape Charles, a distance of 340 square miles. While admitting that surveying from the sky is in an experimental stage, R. Lester Jones, director of the Coast and Geodetic Survey says: "The great possibilities of airplane photography in connection with the water and land work of the Coast and Geodetic Survey are looming up as a potential factor in expediting the mapping of our waterways and interior surveys. This very important subject has been the object of careful study and experiments by officers of the Survey, in collaboration with the other branches of the Government, during the past year and the rapid advance in aerial photography, first seriously undertaken during the war, now promises, with proper development, a method of surveying that will probably far exceed expectations over the old methods in rapidity, economy and minuteness of detail."

The cost of surveying land from an aircraft is computed to be only about one-third of the outlay entailed by common ground methods. The use of a chain or steel tape and level—a checkerboard arrangement—or a landscape camera, and the plane table are the methods heretofore employed in mapping a country. The information thus secured is valuable in the anticipation of an engineering project, location of railroads and highways, and a solution of problems incident to water supply and drainage. These are peace-time applications of the topographic map, while in strifes of magnitude the survey lends itself readily to use in directing military movements and establishing fortifications. As such, the art of airplane photography first became entrenched and out of this war-created difficulty has emerged its possibilities of expediting a complete mapping of the Atlantic and Pacific coasts. The Coast and Geodetic Survey has detailed G. C. Matteson to devote his undivided attention to the subject of airplane photography.

New Theory of the Slotted Wing

In a paper recently read before the Society for Aeronautical Science at Munich, Dr. Betz dealt with a certain development in sustaining planes or aircraft wings due to Lachman in Germany and Handley Page in England. The object is to increase the lift by providing slots in the wing parallel to the leading edge. If these are to be effective they must extend without interruption across the entire width of the wing. This arrangement may also be regarded as an extra plane of small depth placed in front of the main wing at its leading edge so that there is only a very small space left between the two. The maximum lift of the plane is thereby increased by 80 per cent or more. There are different explanations of this phenomenon. One is that the small plane located in front of the main plane is located in an air stream whose conditions of flow are determined by the main wing. It follows that at the leading edge of the main wing the air speed materially exceeds the speed of flying. The reactions of the air on the small wing in front therefore are considerably greater than if it passed through space at the flying speed.

The new explanation of Dr. Betz is based on the fact that for a given speed the lift of a plane increases with the angle of incidence until the air stream on the upper surface can no longer follow that surface. If the angle of incidence becomes too big, a main condition of flow disrupts, the air stream separating from the plane, causing a field of eddies which grows with the angle of incidence. Such eddies have a tendency to form even in the case of small angles of incidence, but the air, passing over the plane immediately washes them away, and thus maintains a smooth, lift-creating stream. In the case of large angles of incidence this becomes impossible. But if the air stream on the top of the plane is reinforced by air passing through the slot in the wing from the under to the upper side, the lift-creating flow conditions can be maintained even with larger angles of incidence. New energy is being supplied to the air stream on top of the plane by the air flowing through the slot, which enables it to continue to wash away the eddies. This energy has to be paid for, however, the phenomenon being accompanied by increased drift of the slotted plane as compared with a plane without slot.

This new explanation is valuable for the reason that it furnishes a basis for judging the value of new plane combinations of the kind referred to, and facilitates the arrangement of systematic test series in a field where the number of combinations is almost without limit.—*Automotive Industries*

Book Review

AIRPLANE PERFORMANCE CALCULATIONS. By Harris Booth. (E. P. Dutton & Co.)

This is a new book recently added to the "Directly Useful Technical Series." Like other books of the same series it aims to supply sound theory in a form that is immediately available for practical use. The plan of the book seems admirably suited to the purpose. It is divided into three main parts:

1. Descriptive and Theoretical. 2. Practical Procedure. 3. Illustrative Examples. Each part has the same sequence of chapter headings.

At the end of the book is an additional chapter giving the complete analysis of a typical machine.

Our unfavorable criticisms are largely negative in character. The authority for the various data submitted is very seldom given, so that one must take the figure more or less on faith, and this is somewhat shaken by the occurrence of some rather obvious typographical errors. The methods also should be taken with a grain of salt for any very radical departure in design. We imagine for example that a wind tunnel specialist would be rather skeptical of the idea that the cockpit and radiator resistances can be simply added to that of the fuselage proper.

The book is fairly complete as far as it goes, but takes no account of stress and strength, engine efficiency, stunting, or stability and control.

Canadian Technical Memoranda

Technical Branch of Canadian Air Board Issues Memoranda Covering Many Questions Arising in Aircraft Maintenance

The following technical memoranda have been issued by the Canadian Air Board over the signature of Lt. Col. E. W. Stedman, Director of the Technical Branch.—EDITOR

TECHNICAL MEMORANDUM NO. 7

"EAGLE" ENGINES—ALUMINUM ENGINE SUSPENSION BRACKETS

A case has arisen of a fracture of one of the aluminum suspension brackets of an "Eagle" engine in service.

On examination of this fracture it would appear to have been caused by the engine bearer being oversize in diameter, and the engine foot being forced down on to same by tightening up the bolts, thus setting up fracture working from the inside of the bracket outwards.

It is most important that the bearer tubes should not be oversize, as the design of the bracket is such, owing to the stiffness of the section involved, that, with an oversize bearer, stresses would be set up which would eventually result in a failure.

Alleroatsly, it is equally important that the centers of the bearer tubes should be correct. Should the centers be low with a similar result, as described, would arise, especially if the bearer tubes are rigid laterally.

In installing engines, therefore, it is important to observe that the bearer tubes are not more than .002 in. oversize, and at the same time, providing the tubes are correct in diameter, that the centers of the tubes are correct, namely,

.009 in.
24 in.
.009 in.

It should be kept in mind that there is less danger when the centers of the tubes are on the short side than when they are too wide. In the latter condition, the tube throws a load on to the outer edge of the engine bracket, and sets up a bending movement tending to start a crack, similar to the one recently examined.

Should there be no lateral supports to the tube close to the engine brackets, then the bearer tubes would, of course, have sufficient flexibility to allow for slight variations in the center distances.

The checking of the centers of the bearer tubes should form part of routine inspection before installation of the engine.

TECHNICAL MEMORANDUM NO. 8

FIXING PROPELLER BOSSES—ROLLS-ROYCE ENGINES

It is essential in fixing propeller bosses on to the shaft to ensure that the serrations are a close fit, and that there is no slack on these serrations when the propeller boss is in position before tightening up the fixing nut.

To fix the boss in position, the serrations should preferably be a slightly tight fit, such that the fixing nut must be used to draw the boss in position.

It is important also that the fixing nut is screwed up tight before locking, and that the propeller boss is binding against the cone of the shaft at one end and the cone of the nut at the other.

While the engine is in service, this nut should be periodically examined and re-locked as part of the daily inspection.

TECHNICAL MEMORANDUM NO. 9

USE OF GLUE IN CONSTRUCTION OF HULLS AND FLOATS.

Whenever it is necessary to make use of glue in the construction of hulls or floats of aircraft, only an approved casein cement may be used.

When fabric is utilized to protect the edges of three-ply parts or for any other purpose in the construction of hulls or floats marine glue must not be used where it may come into contact with Bitulin or any other Bitumastic paint as this marine glue is dissolved by the latter preparations. In such cases casein cement should be used.

Marine glue must, however, be used for attaching fabric to the bottom of floats and in this case one coat of approved paint should be applied over the fabric before the anti-fouling composition is put on.

TECHNICAL MEMORANDUM NO. 12

EMERGENCY METHODS OF OBTAINING EXTRA COOLING

In some cases it has been found that machines give trouble due to boiling and that some emergency method of overcoming the difficulty is necessary.

The following notes indicate methods that have been tried with more or less success, and these may be useful under certain circumstances again:—

1. *The Addition of a Lip to the Front of Radiator.* In some machines, particularly of the tractor types, the cowling is curved round so as to overlap the front of the radiator. It has been found that an increase of about 10 per cent in the cooling can be obtained by doing away with the curved-in piece of cowling and fitting cowling around the radiator which simply stands out in the fore and aft directions. This projecting lip should not be more than about 1½ in. beyond the face of the radiator.

2. *Spiral Air Deflectors.* It has been found that anything that tends to increase the turbulence of the air flowing through the radiator tubes will increase the cooling. In this connection, some spiral air deflectors were tried. These consisted of spirals of iron wire, 0.5 mm. in diameter, ½ in. pitch, and ¼ in. long, fitted tightly into the open end of the tube and flush with the face of the radiator. Tests showed that this increased the cooling effect up to as much as 30 per cent.

There are, of course, several objections to this which make it useless for anything but emergency work, for instance,—

The tubes in contact with the iron wire are liable to corrode and also the process of inserting and removing the spirals is difficult to do without damaging the tubes.

3. *Remnant of Cowling.* The effect of removing the cowling of an engine is to increase the cooling by about 20 per cent at the expense of efficiency in the machine.

A very usual cause of boiling trouble, especially when it has been found to occur after machines have been in service some little time, is due to the fact that tap or spring water has been used instead of rain water. In all cases, care should be taken to use only rain water for radiators, as, otherwise, there is bound to be a deposit of some sort in the radiator tubes and water jackets.

TECHNICAL MEMORANDUM NO. 15

STARTING AERO ENGINES AT LOW TEMPERATURES

From preliminary reports of experiments carried out last winter by Prof. Robb, at Edmonton, it is suggested that the following means of starting Liberty engines at low temperatures may be found to be effective. A complete report will be circulated as soon as received.

It is suggested that for the efficient doping of the engines some form of priming pump similar to the Rolls-Royce primer is necessary.

At temperatures over 20 deg. F., liberal doping with gasoline is sufficient except that the motor will require to be turned over several times after doping to ease it up.

At temperatures between 20 deg. F. and 10 deg. F. doping with a mixture of three parts gasoline to one part of ether will be found to be effective.

At temperatures around zero, a one to one mixture is satisfactory.

At temperatures in the neighborhood of 12 deg. below zero,

it will be found that a mixture of two parts ether to one part gasoline is required

TECHNICAL MEMORANDUM NO 16

Use of Cotton Waste during Engine Overhaul

It has been found that cases of engine failure have been due to the use of cotton waste during overhaul

These cases have appeared to be due not to waste being accidently left in the engine parts, but to an accumulation of small pieces of cotton thread that had been left on engine parts after cleaning with waste.

Under these circumstances it has become necessary to prohibit the use of cotton waste in Service workshops where engines are being overhauled, and commercial companies are strongly recommended to adopt the same policy

TECHNICAL MEMORANDUM NO 17

Anti-Freeze Mixtures

Researches on anti-freeze mixtures are being conducted and the results will be communicated when completed In the meantime, it is recommended that denatured alcohol-water mixture should be used, as indicated in the attached table (Extracted from U. S Air Service Information Circular, No 278)

In selecting the mixture to be used, consideration should be taken of the usual ground temperature to which the radiator may be subjected and a mixture containing as little alcohol as possible used

When running the engine the radiator temperature should be kept down to 75 deg C (167 deg F) and should never exceed 80 deg C (176 deg F) or an excessive loss of alcohol will result.

Percentage of alcohol by volume	Freezing Point. Deg F
0 0	32 0
2.5	28 4
5 0	27 0
7 5	26 2
10 0	24 8
12.5	23 6
15 0	21 2
17 5	19 2
20 0	16 7
22 5	14 9
25 0	11 3
27 5	8 8
30 0	5 4
32.5	3 2
35 0	minus 0 9
37 5	" 4 0
40 0	" 7 8
42 5	" 11 2
45 0	" 16 4
47 5	" 19 8
50 0	" 24 0

TECHNICAL MEMORANDUM NO 19

Short Time Storage of Aero Engines

The following general instruction for the short time storage of aero engines may prove of assistance to the personnel concerned.

1 Engines should be stored on a suitable stand constructed so that no part of the engine rests on the floor, so that the weight is taken an the correct supporting surfaces, and so that the engine can be turned.

2 Pour a quantity of the oil generally used for the engine into each cylinder so as to cover the head of the piston

3. Turn the engine very slowly by hand through two complete revolutions of the crankshaft to distribute the oil over the cylinder walls.

4 Fit spark plugs into all cylinders.

5. Grease with mineral jelly all bright parts and unpainted aluminum parts exposed to the air

6. Fit blank flanges over exhaust ports

7. Clean all contacts and parts of magnetos.

8. Clean oil filters

9 Fit covers over all open water pipes, oil pipes, air pipes, or gasoline connections. These covers must be such that nothing can be left in the engine when it is subsequently installed in an airplane.

10 Cover the whole engine with a sheet or piece of old fabric.

11. Label engine with details of work done on it, whether it is serviceable or requires overhauling and any parts that are missing

12 Make entries in the log books to the effect that the engine has been prepared for storage and that oil has been placed in the cylinders

13 If possible rotate the engine once a week during storage

TECHNICAL MEMORANDUM NO 26

Earth Wires

The importance of the earthing wire of an airplane is not always fully realized, and the following notes are put forward for the information of all personnel concerned —

Terminals All earth wires should be finished off with proper circular or hook terminals for attachment of the ends.

Joints Under no circumstances must joints occur in earth wires, they must always run from terminal to terminal in one continuous length

General All earth wires must be run in such a way that they can easily be inspected, they must also be properly supported and protected In places where they are attached to any part of the airplane they must be seized with insulating tape, and if metal clips are used to hold them the clips must be lined with vulcanized fiber Under no circumstances should staples be used for supporting earth wires.

Testing for continuity All earth wires must be tested out periodically by means of a galvanometer, lamp, or bell This is most important, as several bad accidents have occured through the faulty fitting of earth wires

NOTE. The effect of faulty earth wires should be borne in mind when inspecting these wires

1 If an earth wire is liable to short circuit to any part of the machine in the length of wire between the magneto and the switch, this may result in engine failure due to short circuiting the primary current in the magneto in the same way as occurs when the switch is moved to the off position

2 A break in the earth wire, which is not short circuited to any part of the machine, acts in exactly the same way as if the switch was left continually on with the consequence that a spark may occur in the cylinder when the engine is turned over This latter fault has been the source of a large number of accidents when propeller swinging

TECHNICAL MEMORANDUM NO. 21

The Use of Motor Transport or other low grade Gasoline in Aircraft Engines

It has been occasionally necessary for mechanical transport gasoline to be used in aviation engines and, therefore, the following extracts from the U S Air Service Information Circulars Nos 216 and 227 are of particular interest.—

With the present design of aviation engines and the means of vaporizing and distributing the fuel, commercial low-test automobile gasoline does not give satisfactory performance Detonation obtained with the compression ratios now in use precludes the use of straight low-test fuel unless compression ratios are lowered, or anti-detonating compounds are mixed with the fuel For this reason it would appear impracticable to use commercial low-test automobile gasoline in present types of aviation engines except in emergencies.

In a test with a standard Liberty engine it was found that the heads of six pistons were cracked and seven of the pistons were slightly eroded, while three were badly eroded

The idling and pick up were fairly satisfactory, but it is deemed advisable to warn pilots who may be compelled to fill their machines with automobile gasoline while on cross country trips that they should take particular pains to keep the engine warmed up on long glides, as there is much more danger of losing the engine when gliding with low-test gasoline than with aviation gasoline

Committees of the Aero Club of America

Roster of Aero Club of America Committees Serving for the Fiscal Year November 1921 -- November 1922

House Committee

Cole J Younger, Chairman, A Travers Ewell, W Daly, Charles Jerome Edwards, Augustus Post

Membership Committee

Col Harold E Hartney, Chairman, Philip J. Roosevelt, Eddie Rickenbacker

Law Committee

Philip A Carroll, Chairman, W W Niles, Stephen Philbin, W Jefferson Davis.

Auditing Committee

George M. Houston, Chairman, Albert P. Loening, Cole J. Younger, Charles H Cox

Airways & Maps Committee

A Travers Ewell, Chairman, Howard A. Scholle, Maj W G Schauffler, Hugh D McKay, Major Smith (Fla.), E Lester Jones, Chief, U. S Geodetic Survey, Ralph H Upson, Charles J Riddle, Horace Hickam, Otto Praeger, Col E H Shaughnessy, Charles Dickenson, Capt. S. C Coon, Albert B Lambert, O. C Merrill, Chairman, Board of Surveys and Maps of the Federal Government, Wash, D C, Fred Harvey, Jr, Gould Dietz, Chas A Johnson, Denver, Colo, Guy T Slaughter, George B Harrison, W. E. Boeing, Seattle, Wash.

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Collier Trophy Committee

Henry Crane, Chairman, William A. Larned, James A Blair, Jr., Caleb S Bragg

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Howard E Coffin, Chairman, C. M Keys, Richard F. Hoyt, Philip J. Roosevelt.

Special Banquet Committee

Benedict Crowell, Chairman, Howard E Coffin, James A. Blair, Jr., Maurice G. Cleary, Caleb S Bragg, Cole J. Younger, Augustus Post, Howard A Scholle.

Foreign Relations Committee

Frank P Lahm, Chairman, Maj William A Scully, Philip A. Carroll, F Trubee Davison, Admiral Bradley A. Fiske, U. S. N.

Foreign Service Committee

Myron T Herrick, Hon Chairman, Sidney B Veit, Hon. Secretary, Dr A. L Hipwell, Treasurer, Frank S. Lahm, William S Hogan, E L. Gros, M. D., Louis D Beaumont, G. Camphell Wood, Lt Col William Thaw, John Weare

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Contest Committee

Regular Members—Caleb S Bragg, Chairman, Nelson Doubleday, Maurice G Cleary, Harold E Hartney, Harry F Guggenheim, David McCullough, Henry Crane, Alexander Klemin, William A. Larned, Richard F. Hoyt, Howard Scholle

Asso Members—R. W Schroedar, Chicago, Eddie Rickenbacker, Detroit, Jessie T. Vincent, Detroit, Sidney D Waldon, Detroit, Harold E Hartney, Washington, Robert Breese, Paris

Timers—R. A Leavell, Chicago, L. M Woolson, Detroit

A view of the 14th annual banquet of the Aero Club of America, held on Jan. 9, last, at the Hotel Commodore, New York City

"Who's Who in American Aeronautics"

(Copyright, 1921, by The Gardner, Moffat Co., Inc.)

The biographical sketches of men who are prominent in American Aeronautics are printed periodically in AVIATION. The first series will be shortly published in a more durable form, and revised issues will be published semi-annually to take care of the frequent changes in station of Army and Navy officers, and such other changes as may occur. As errors and omissions are liable to occur in a compilation of this character, interested parties are requested to notify "Who's Who" Editor of the necessary corrections so the record may be kept up to date.

John William Miller

MILLER JOHN WILLIAM, Consulting, Civil and Aeronautical Engineer born Dawson Ill Feb 22 1880 son of John H Miller and Ida A (Nichols) Miller married, Florence Levetinsky 1909

Educated Public schools of Friend Nebr B Sc Civil and Mechanical Engineering 1905 University of Nebraska.

Professional Expert Mechanic, McCormick Harvesting Machine Co 1896-1897 Consulting Engineer City of Friend Nebr 1903 Assistant Engineer Chicago & Northwestern Ry 1905 1908 Locating Engineer C B & Q R R 1907 Foster Cushman Motor Co Lincoln Nebr 1908 Division Engineer C B & Q R R 1909 Assistant Professor Civil Engineering University of Washington 1909-1912 In charge of part of survey of Camp Lewis Cantonment 1917 Chief Engineer Boeing Airplane Co July 1917 to Jan 1919 Professor in charge of Aeronautics University of Washington 1919 Consulting Engineer American Aircraft Corp 1920 President and Chief Engineer J W Miller Aircraft Corp Seattle Wash June 1920 to date

Aeronautical Activities Built and flew gliding machines 1895 1905 did photographic reconnaissance surveying from own plane 1909 lectured on aeronautics and did experimental work 1909-1917 Chief Engineer on development of plant of Boeing Airplane Company and in design of aircraft 1917 1918 designed sport plane for American Aircraft Corp 1920

Member Assoc Member American Society of Civil Engineers Honorary Member Aero Club of the Northwest

Present Occupation President and Chief Engineer J W Miller Aircraft Corp

Address 9624 10th Ave N E Seattle Wash

Harold Evans Hartney

HARTNEY HAROLD EVANS, Executive Secretary Aero Club of America born Canada April 19 1888 son of James H Hartney and Annie F Hartney married Irene McGeary Nov 11 1914

Educated B A 1911, University of Toronto B A 1912 University of Saskatchewan 1914 graduate law Saskatchewan Barrister and Solicitor

Professional Lawyer

Aeronautical Activities Oct. 1915 joined Royal Flying Corps Two years service with same became captain and received Italian Silver Medal for Valor Sept 1917 transferred with rank of Major to American Air Service organized trained and took to front 27th Aero Squadron Aug 21 1918 promoted to Group Commander 1st Pursuit Group Dec 1918, duty at G H Q Chaumont then appointed Lt. Col. and returned to U S Office Chief of Air Service and successively held positions as Chief Training Acting Chief Operations and Chief, Civil Affairs resigned Oct 1921

Flying Rating Airplane Pilot

War Honors Distinguished Service Cross Legion of Honor Croix de Guerre (2 palms) Italian Silver Medal for Valor British War Medal Aero Club Medal of Honor

Member Army and Navy Club (Wash.) Aero Club of America Aero Club of Omaha Nebraska State Air Association Princeton Aero Club

Present Occupation Executive Secretary Aero Club of America

Address 507 Mills Bldg home 3313 Ross Place N W Washington, D C

Charles Fraser Redden

REDDEN CHARLES FRASER, Commercial Aviation born Buchanan Mich., July 25 1871 son of S W Redden and Sophia (Fraser) Redden married Ethel M Gillies April 24 1890

Professional 1896 to 1905, General Sales Manager Chasmar Winchell Press, 1905 to 1912, General Eastern Manager, Automobile Division Studebaker Co of South Bend, Ind 1914, organized Redden Motor Truck Co

Aeronautical Activities President, Aeromarine Engineering and Sales and Airways Inc, April 1920

Present Occupation President, Aeromarine Engineering and Sales Co. and Aeromarine Airways Inc, April 1920

Address 1800 Times Bldg, New York City home, Hotel Alvord, East Orange N J

Henry Middlebrook Crane

CRANE HENRY MIDDLEBROOK, Consulting Engineer born New York City June 13 1874 son of Jonathan H Crane and Elizabeth (Headley) Crane

Educated Phillips Exeter Academy Bachelor of Science Mechanical Engineering 1895 Bachelor of Science Electrical Engineering 1896 Mass Inst of Tech

Professional American Tri & Tri Co, experimental laboratory Boston, Sept. 1896 to Nov 1898 Western Electric Co, New York, Nov 1898 to May 1906 General telephone experimental and engineering work during the last year with the Western Electric Co developed a gasoline launch engine and in summer of 1906 organized the Crane & Whitman Co later the Crane Motor car Co and built a factory in Bayonne N J during the eight years until 1914 developed four models of motor cars building a number of each model also the large 8 cylinder engine for the international champion speed boat, Dixie 2 and a second similar engine which with the first formed the twin screw power plant of champion Dixie 4 President and Chief Engineer of these companies In the winter of 1914 1915 the Crane Motor Car Co was joined with the Simplex Automobile Co and he became Vice President and Consulting Engineer of the latter Co In the summer of 1916 having returned from France with the rights to build the Hispano-Suiza aeronautical engine he became Vice President and Chief Engineer of the Wright Martin Aircraft Corp which was an amalgamation of the old Wright Co the Simplex Automobile Co and the Glenn L Martin Co retained this position until resigned from the Wright Aeronautical Corp the successor to the Wright Martin Aircraft Corp about March 1 1920

Aeronautical Activities Sent to France in Nar 1915 to choose an aeronautical engine for manufacture by Simplex Automobile Co. built a small 4 cylinder water cooled airplane engine about 1912 from 1916 to 1920 engineered the 150 hp Hispano Suiza into production developed and engineered into production the 200 hp. and 300 hp developed a 300 hp. geared motor and partly developed a cannon motor in 1918 joined with G C Loening and others in the organization of the Loening Aeronautical Engineering Corp. of which he is still a director the first work of importance undertaken was the development of a monoplane two seater fighter for the Wright-Martin Co to use the American 300 hp. Hispana

War Service Liberty Engine Test Committee Chairman appointed by Aircraft Board Jan 12 1918

Member Chairman of the Technical Committee of the Aero Club of America Society of Automotive Engineers Society of Mechanical Engineers Automobile Club of America University Club (N Y) Piping Rock Club Engineers Country Club

Present Occupation Consulting Engineer

Address 44 West 44th St., New York City

Earl S Daugherty

DAUGHERTY EARL S Commercial Aviation born Des Moines Iowa, April 4 1887, son of Charles J Daugherty and Mary A. (Jones) Daugherty

Educated Public schools of Long Beach Calif

Professional Banking 1905-1907 photographer 1908-1910 automobile factory, 1910-1911

Aeronautical Activities Learned to fly at Dominguez Field, June 1911 exhibition flying and testing machines, 1912 testing experimental and exhibition work for the Illinois Aero Construction Co, 1912 exhibition flying from 1913 to 1915 passenger carrying, 1916-1917 flying instructor Signal Corps Aviation School, San Diego Calif. 1917 1918 flying instructor U S Air Service March Field 1918 1919 opened the Daugherty School of Aviation and Flying Field at Long Beach Calif June 1919 exhibition work, instruction and passenger carrying to date

Flying Rating Aero Club of America License No 87 Reserve Military Aviator Sept 1918.

War Service July 1917 to March 1919

Present Occupation Operating the Daugherty School of Aviation and Flying Field

Address Willow St and American Ave home 431 E Seaside Blvd, Long Beach, Calif

John Miller Larsen

LARSEN JOHN MILLER Airplane Constructor born Hjorring Denmark Nov 11 1874 son of Anthon Larsen and Christina Larsen married Jensine A Killgaard, March 7, 1894

Educated Public schools of Denmark.

Professional Creamery business in Denmark until 1892 introduced scientific Danish creamery method in American dairy industry Pioneer in making butter and pasteurized cream imported and invented creamery machinery 1900, designed manufactured and installed Larsen Ice Machines from two to one-hundred fifty tons capacity in all parts of the United States took Grand Prize Panama Pacific International Exposition 1915 set new world's record for the lowest temperature —58 deg F 1915 1917 assisted Allies in conserving Russian food supply by refrigeration Invented successful method for keeping fish fresh without freezing

Aeronautical Activities Took up flying as a sport in 1918 holds record for civilian cross-country flying has flown over Europe and North America about 250,000 to 300,000 miles holds American long distance non-stop record Omaha to near Philadelphia altitude record with five passengers of 23,000 ft imported and sold large number of Junker all metal monoplanes improved and perfected them by exhaustive flying tests, at present manufacturing J L All-Metal Monoplanes JL6 airplane owned and made by him, established World's Endurance Record 26 hr 19 min 35 sec

Member Aero Club of America

Present Occupation Engineering and investments

Address J L Aircraft Corp 347 Madison Ave New York City

Charles Lester Morse

MORSE CHARLES LESTER 1st Lieut., Air Service born Colebrook N H June 2 1893, son of Charles Morse and Lida Jane (Kellam) Morse

Educated Public schools of Lancaster, N H B S in Civil engineering 1915 Mass Inst of Tech Course in Aeronautical Engineering 1918-1919 Mass Inst. of Tech.

Professional Junior Engineer New York Public Service Commission June 1915 to Aug 1917

Aeronautical Activities Cornell Ground School, 1917 Primary Training Mineola and Lake Charles 1917 1918 commissioned 2nd Lieutenant, March 1918, training at Camp Dick, Taliaferro Field Pilot instructor in Aerial Gunnery at Ricks Field to Oct 1918 course in Aeronautical Engineering Mass Inst. of Tech., Oct 1918 to Feb 1919, transferred to McCook Field Feb 1919, Aeronautical Engineer in Airplane Section Structure and Aerodynamics Branch and Pilot at present time

Flying Rating Reserve Military Aviator, March 1918 Airplane Pilot.

War Service As above.

Present Occupation 1st Lieut Air Service

Address McCook Field Dayton, Ohio home, Middle St Lancaster, N H

Harold Arnold Steiner

STEINER HAROLD ARNOLD Clothing business born, New York City Nov 8, 1890 son of Albert P Steiner and Frankie (Arnold) Steiner

Educated Phillips Andover Academy, 1908 B A 1912, Yale University

Professional Sales Manager, Steiner & Son, Inc

Aeronautical Activities Enlisted, July 13, 1917, graduated Princeton School Military Aeronautics Oct. 1917 trained with British at Deseronto and Leaside, Canada and Ft. Worth, Tex. Coast Patrol Mineola June 1918 overseas with 186th Aero Squadron, Issoudun July 1918; Romorantin (ferry pilot) Aug 1918 to Jan 1919

Flying Rating Reserve Military Aviator Feb. 1918

War Service Army, July 1917 to Feb 1919

Member Andover Club Yale Club (N Y), Aero Club of America

Present Occupation Sales Manager, Steiner & Son, Inc., Treas DeLuxe Air Service, Inc

Address Steiner & Son, Inc., home Metropolitan Hotel, Asbury Park, N J

Variable Pitch Propeller Demonstration

There has been on demonstration at the works of The American Propeller & Mfg Co., Baltimore, Md. a propeller designed by Spencer Heath and now in operation on a 4,000 lb land machine under full load and power conditions. The blades of this propeller can be adjusted universally in their sockets for any angle of forward or reverse pitch while the engine is running, the power of the engine itself being used to effect the changes of pitch. A light pull or pressure on a button is all that is required to produce any change of pitch desired. When the engine is at rest the pitch may be altered or reversed by turning a small hand crank located conveniently to the operator. At all times and during all changes of pitch the exact position of the blades is graphically shown by an indicator on the instrument board.

The speed of the engine is automatically controlled by the indicator mechanism so as to give the correct throttle position for every possible blade position and thus prevent racing or stalling the engine by manipulation of the pitch. The engine is subject at all times, however, to manual control of the throttle which may at any time interrupt and supervene upon the automatic throttle control. The entire operating mechanism is entirely disengaged and the blades securely locked at all times except during change or adjustment of the pitch.

Mr. Heath has worked on this invention for a couple of years and is most enthusiastic about it in connection with airships.

In discussing his invention Mr. Heath said:

"The average airship of the Zeppelin type is at the mercy of the wind and runs an enormous risk every time a landing is necessary. The crew has to maneuver the huge boats so that the rudders can be brought into play and act as brakes. With my variable or universal pitch propeller the dirigible can make its own wind and can reverse or go ahead as easily as a steamship entering her dock."

American Railway Express and Air Transport

Reports to the effect that the American Railway Express Co has contracted for aerial transportation of express packages are denied by R. E. M. Cowie, vice president in charge of the company's operation in the East.

"While such reports have been prevalent lately", said Mr Cowie, "emanating apparently from promoters of aerial enterprises, those experienced in transportation will plainly realize that any success in utilizing new agencies for improved transportation can come only as a result of carefully worked out plans, which must prove their practicability before they are permanently adopted.

"In the meantime any use of the name of the American Railway Express Co in connection with the promotion of commercial airplane service is premature and unauthorized."

When asked if he did not think "express by airplane" was a future possibility, Mr Cowie replied that when aviation for commercial purposes has developed beyond the promotion stage and demonstrated its practicability and reliability, it would be fair to assume that the use of airplanes to carry small emergency express shipments will be added as a step in the evolution of rapid transportation.

Marshal Foch at Ellington Field

Marshal Foch visited Houston for four hours on Dec. 7, and Ellington Field did her share in the welcome accorded him. Two formations of five SE5's met the train some fifty miles out of Houston, and escorted the special Legion train into town. The Marshal ran from door to door of the train, saluted the fliers, and exhibited his pleasure by gestures, which constituted an international language, for they were easily read, and some of them were so humorous as to be well worth seeing. The exuberance and enthusiasm of Marshal Foch was surprising. After his arrival in Houston the Marshal told Captain Hunter that this was the first time he had had an aerial escort, and he was greatly pleased.

The class of student aviators piloted the SE5's, led by their instructor, Lieutenant Sheridan, who reported the work of the pilots most excellent and well disciplined.

The Aero Club of Minneapolis, Minn.

The Aero Club of Minneapolis has issued the first number of *Contact*, a mimeographed monthly bulletin, with the object of bringing all members in closer touch with the Club's purposes and its activities, the advancement of aeronautics and the encouragement of the use of aircraft throughout the Great Northwest.

The general purpose of the Aero Club of Minneapolis is to promote interest in and to advance the science of aeronautics; to provide by lease or purchase suitable landing fields for the use of its members, to erect, purchase or lease suitable hangars for the use of its members; to purchase or lease suitable aircraft for its members, to provide, erect, own, lease, furnish or manage any buildings, halls, or rooms for the use of the Club.

The Aero Club maintains downtown quarters at Tenth Street and Nicollet Ave., Club, library and lounge rooms, a dormitory with a waiting list, a mighty fine cafe serving the best meals in the city for the money.

The present officers and co-aids have increased the membership from 200 to 325 since Jan. 1, 1921. The fixed assets have increased $2,448.00 since that time.

Since the war, the Aero Club of Minneapolis accomplished the following:

1. Was primarily instrumental in giving Minneapolis one of the finest, and so recognized, municipal landing fields in the United States.
2. Aided materially in securing for the Minnesota National Guard the first Aerial Observation Squadron in the United States.
3. Has awakened a live interest in real aviation here in the Northwest through Aerial Club activities, such as Field Days, Flying Dinners the coming National Air Derby and Aviation Ball.
4. Has secured the whole hearted cooperation of Minneapolis and St Paul leading newspapers and has done much to mould newly awakened public opinion regarding Air Service as a new modern means of fast transportation and national defense, in place of the wing walking stunts and "crash news," which have occupied the public minds for so long.

The Club has secured a Canadian Curtiss training plane which will be kept at its own landing field for the benefit of its members.

The Aero Club of Minneapolis deserves warm commendation for its efforts in the interests of aeronautics.

Roma Being Fitted with Liberty's

The Army airship Roma, four of whose six Ansaldo engines failed on her recent cold and stormy flight to Washington and return to Langley Field, Va., are being replaced by six 400 hp Liberty engines more suited to the climate of this country. The Ansaldo engines failed to function properly, due, it was said, to too great an amount of radiation surface and the fact that they were not designed for as cold weather as was met with on her initial official trip and christening on Dec 21 when the installation of the Liberty's will be completed, further tests flights will be made.

As soon as the ship is in shape for cruising, in about three weeks, General Patrick intends to have her make another trip to Washington in order to give the officials an opportunity to see the greatest semi-rigid aircraft in the world and take short trips in her. Later on, it is understood she will make longer trips inland and eventually, when not being used for training purposes, she will undertake a trans-continental cruise.

Hamilton High-Lift Wing

A new high lift monoplane wing which it is claimed will more than double the pay load of Canucks, JN's and Standards is announced by the Hamilton Aero Manufacturing Co. of Milwaukee. A description of this wing will appear in a forthcoming issue of AVIATION.

The company will, as formerly, continue to specialize in high efficiency propellers.

Type D Airship at Ross Field

The long hoped for "D" type airship arrived at Ross Field on Dec 6, and is now under the care of Lieut Shoptaw, who will supervise the preparation of the airship for flights. Some work must be done to realign the car and put it in first class shape.

As soon as the new steel hangars are completed the ship will be inflated and put in the air The concrete standards are all laid and set, everything being ready for the erection of the steel structure which is expected to arrive shortly from the east

Port Washington to Palm Beach in a Seagull

The Curtiss Metropolitan Co.'s flying boat Seagull I recently flew from Port Washington, L. I., N Y, to Palm Beach, Fla., to enter the passenger-carrying business at the latter place The crew of the boat consisted of Clifford L. Webster, pilot, and Horace Wilson, mechanic

The start from Port Washington was made at 10 11 a m Dec 10, 1921, and the boat arrived at 9 30 a m. Dec 14 at Palm Beach, covering the distance of 1257 miles in 21 hr 32 min flying time, and 3 days 23 hr 19 min elapsed time The average speed of the C6 engine was 1550 r.p.m., and 265 gal of fuel and 12 gal of oil was consumed.

The log of the flight follows.

Test of Flotation Gear

A test of the merits of a flotation gear installed on a De-Haviland 4B plane under the direction of 1st Lieut F D Hackett, Air Service, engineering officer at Crissy Field, Presidio of San Francisco, Calif., was made at that station on the afternoon of Dec. 9 The plane was ready for the test at the scheduled time, Photographic Section No 15 being present for the purpose of securing suitable pictures of the event, also many interested observers. Maj George H. Brett, commanding officer of Crissy Field, in company with Maj H. H Arnold, 9th Corps Area Air Officer, gave the signal, and Lieutenant Hackett as pilot, with Master Sergeant Alfred Bernhard as passenger, took off amid the well wishes for a successful trial After circling the field at an altitude of about 1,000 ft., Lieut. Hackett pulled the throttle and nosed her down, while movie men present cranked their cameras, Prior to the the take off, a boat manned by Crissy Field men put out for the Bay and stayed by for the landing of the plane Within an hour and a half after the successful landing, the Crissy Field men had the plane back in the hangar and were preparing it for another like flight Much was gained from this flight, as it certainly demonstrated that the flotation gear will serve its purpose and should be installed in all ships flying out of Crissy Field which work with the Coast Artillery, as their missions always carry them well outside of a safe gliding distance to land

Log of Curtiss Metropolitan Company's Seagull No. 1 from Port Washington, N Y to Palm Beach, Fla. Dec 10 to 14, 1921.

To	Miles	Minutes	Average Alt	Relative Wind	Date	Remarks
Atlantic City N J	118	148	20 feet	Fresh head	December 10	Rough air & water
Chincoteague Va	[illegible]	144	10			
Manteo N C	16[illegible]	122	1,000	Moderate following	11	Good air
Beaufort N C	110	115	[illegible]	Strong side		rough water
Swansboro N C	25	31	15	Light head		
Southport N C	71	87	10	Fresh	12	Rough air rough sea
Charleston S C	131	102	10		12	
Tybee Island Ga	92	100	10	Moderate head	12	
Fernandina Fla	10[illegible]	111	10	side	13	smooth
Titusville Fla	160	136	300		13	Moonlight, good air
Palm Beach Fla	142	118	1,200	following	14	Good air smooth sea
	1257	1292				

NOTES Excepting that obtained at Atlantic City gasoline was the ordinary grade of Texaco and Standard Oil gas. Mobile Oil B was used when procurable at other times Polarine and Texaco heavy oils were used The motor ran perfectly No attention was given it other than supplying gas oil and water and draining gasoline strainer This motor had over 50 hours flying before the start of the trip The plane and hull required no repairs or adjustments Over half a day was lost at Tybee Island Georgia waiting for a strong head wind to shift Start was made at 6 00 p[illegible]

Naval Air News

Atlantic Fleet Air Force

Plans for the winter operations and drills of the Atlantic Fleet Air Force seem to be undecided as yet, awaiting the final agreement between the Bureau of Aeronautics, Admiral Hilary Jones, Commander in Chief of the Atlantic Fleet and Capt Alfred W Johnson, Chief of the Atlantic Air Force. Originally it was planned for the Air Fleet to assemble at Key West and operate with the Fleet later on, either there or off Guantanamo Bay, Cuba.

Although the Shawmut has been relieved by the Wright, this vessel has not yet left the New York Yard where she has been refitting as an Airship Tender, she is now expected to leave for Hampton Roads within a few days however Captain Johnson has been using the Sandpiper The Aircraft Carrier Langley outfitting at the Norfolk Yard is not yet commissioned but it is now believed she will be commissioned, whether completed or not, by the middle of May

Reports from Norfolk state that a radio controlled plane will be taken south with the Atlantic fleet, but no definite information can be secured at the Bureau of Aeronautics, nor will officials of the radio or ordnance bureaus release the details of this crew-less craft of the air

Lieut Commander Zachery Lansdowne, of the Bureau of Aeronautics, who was married here recently, returned to the Bureau on January 3 from leave It is believed that he will be among the American officers assigned to duty in Germany during the construction of the L-type Zeppelin for the Navy Department, and it is rumored that he will be in command of the detachment Commander Lansdowne was the representative of Navy Aviation on the first flight of the British R34 when she came over from England in July 1917.

Lieut. R G. Pennoyer, who is the senior flying officer of the original crew detailed to the ZR-2 which was destroyed over Hull England, will probably be among the officers assigned as inspectors and supervisors when the construction of the "L ship" is started in Friedrichshafen

Rigid Airship Detachment

The last of the Naval Rigid Airship Detachment at Howden, East Yorkshire, Eng., namely Lieut William R. Taylor, Medical Corps, has been ordered to return to the United States.

Lieut. Commander Cecil Y Johnson, was designated recently as commandent of the Naval Air Station at Anacostia, D C., to succeed Lieutenant Bush who was in charge temporarily

Naval Aviators Stop Epidemic

Naval aviators at Hampton Roads are credited with having assisted in the allaying the recent spread of diphtheria at Morehead City, N C., by taking virus there by a seaplane

Hospital corps men stationed at Cape Hatteras Radio Station notified the naval medical officer at Hampton Roads that an epidemic of diphtheria was raging at and about Morehead City, and requested an immedite shipment of diphtheria virus. Realizing that it would require a week to send it by mail, he requested the naval air station to send it by plane. An F-5-L was dispatched from Hampton Roads at 6 30 a m., on Dec. 10, and the virus was delivared at Cape Hatteras within four hours time

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Maj Edwin H Brainard, U S M C., has been detached from duty at the Naval Air Station Pensacola, Fla., and ordered to Ellington Field, Texas, for Aviation duty

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The transfer of Lieut P E Gillespie, Naval Aviation, from Hampton Roads station to Anacostia is expected soon

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Lieut Herbert C. Rodd, Navel Aviation, has been ordered from Pensacola to duty with Air Squadrons, Atlantic Fleet

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Ensigns G H Hasselman, and R S Taylor, have been detached from the Battleship Iowa, and assigned to Air Squadrons, Pacific Fleet.

In an effort to complete the training of its flying personnel, the Bureau of Aeronautics has just ordered thirteen Ensigns who are pilots on a six months tour of duty with the fleets as line officers. These men will have an opportunity to learn something of sea duty and fit themselves for their examinations for promotion to Lieuts. which will be given in June, it was said

The men are Ensigns. P. L. Hynes, E. A Keddie, G Cahill, H E West, G M Boves, P Carle, C J Coatsworth, J. H. Gowan, D. C Gurley, W B. Hollingsworth, J H Schaler, E B Wilkins and W F Sykes.

Roland Rohlfs Joins Aeromarine

Roland Rohlfs, the famous pilot and holder of several aeronautical world's records, has joined the Aeromarine Airways, Inc., according to an announcement by C F. Redden, President of the company Mr Rohlfs has left for Florida where he will take part in the winter operations to and from Florida coast resorts and points in the West Indies

"Roland Rohlfs has probably tested more aircraft then any other American pilot," says an official of the company "Up to the present he has specialized chiefly on military and naval types of aircraft, but like all men experienced in the aeronautical industry he realizes that the greatest possibilities in aerial activities in this country now rest in commercial aviation and he has chosen America's largest aerial transportation organization for his career

"The Aeromarine Airway is glad to have Mr Rohlfs in its organization and his engagement is part of the Airways' policy to build up a staff of trained and efficient personnel in order to maintain its high record of safety and efficiency"

The Aeromarine Airways has numbered among its pilots some of the finest in the country. They are men who have enviable war records and who have turned the knowledge thus gained to commercial aviation Among the better known pilots are Maj B L. Smith, formerly naval attaché of the American Embassy in Paris, and was one of the first American naval pilots Major Smith has flown every kind of aircraft, including Zepplins Another ex-U S Marine Aviation pilot is Edward Musick who flew the Aeromarine eleven-passenger air cruiser Santa Maria from Detroit to Chicago and thence down the Mississippi River to New Orleans and to Key West George Cobb, an ex-Naval Aviation officer is now flying one of the eleven-passenger cabin Aeromarine cruisers for his second season

The U S Army Air Service is represented by D G Richardson, formerly a lieutenant and flying instructor During the past summer he established a world's record for distance in an Aeromarine-Navy flying boat, circumnavigating the Great Lakes and covering 7491 miles.

Coming Aeronautical Events

AMERICAN

Apr. 30 — *Spring Show and Opening Meet, Curtiss Field, Mineola, L I*

May — *National Balloon Race*

Sept 4 (about) — *Detroit Aerial Water Derby, Detroit (Curtiss Marine Flying Trophy Competition)*

Sept. 15 (about) — *Detroit Aerial Derby, Detroit (Pulitzer Trophy Race)*

Sept. 30 — *First Annual Interservice Championship Meet. (In preparation)*

FOREIGN

Aug. 1 (about) — *Coupe Jacques Schneider (Seaplane speed race.) Italy probably Venice*

Aug 6 — *Gordon Bennett Balloon Race, Geneva, Switzerland*

Oct. 1 — *Coupe Henri Deutsch de la Meurthe (Airplane speed race.) France.*

American elimination trials, if required, to be held about Aug. 15 at Mitchel Field, L. I.

Foreign News

Argentine

Another indication of the snccess which is attending the efforts of Colonel Mosconi, Chief of Argentine Army Aviation, and of the Argentine Patriotic League and the Aero Cluh of Argentina in arousing enthusiasm in aviation matters, is the presentation of a Bristol 300 hp. Hispano-Suiza to the military aviation school at El Palomar hy the city of Avellaneda. There seems to be hnt little donht that the precise and practical plans of Colonel Mosconi for air rontes, landing places, military-civil air station, etc., and the calls on the provincial governments and cities, and on wealthy citizens for cooperation, are bearing fruit.

Bermuda

The Bermuda and West Atlantic Aviation Co., has proposed to the government of British Guiana to make a demonstration and survey for aerial transportation. The offer will prohahly be accepted.

France

The Compagnie Transaérienne de Tourisme et Messageries, is making overtnres to the Portuguese government for valuahle concessions in Portngal and the islands and also in Portuguese Africa. American Minister Thomas H. Birch states that the company proposes a mail and passenger service for Lishon, Paris being the starting point. Free transportation of Portuguese mail and the relinquishment of air material to Portugal in case of war are some of the inducements offered hy the company.

The air mail service, maintained with the assistance of the French government up the Maroni River, which is the houndary between French and Dutch Guiana, has heen carried on with considerahle difficulty, according to reports received from travelers. It is said that the engines are much affected hy the moist climate, and that the variahle depth of rivers renders a landing on their surface very dangerous, hecause of concealed rocks which are often hnt a few inches helow the surface of the water. This latter difficulty is intensified hy the fact that the water is very often covered with mist, which prevents carefnl ohservation before landing.

Sweden

The hiweekly air mail service between Stockholm and Reval, run hy the Svensko Lnfttrafik Aktiebolaget during the months of Jnly, August and September, was suspended on Oct. 1, 1921. The American Minister, Ira N. Morris, at Stockholm, reports that from a technical point of view the service was very successfnl, hnt the infrequency of passengers made it a nonpaying enterprise.

The Postmaster General paid a snhsidy for the carrying of mail, hnt this was not large enough to cover even mere working expenses. Of twenty-one round trips promised nineteen were carried ont. The distance was covered in 2 hr. and 20 min., on an average, while the steamers take 24 hr. Only twenty-one passengers were carried altogether, and 800 kilos of mail were transported from Stockholm to Reval.

This service has shown that aerial transportation over the Baltic is not only practicable, hut is likely to fill a real need when Rnssia again revives.

Switzerland

The Swiss govenment has decided to increase the financial help that it is giving to civil aviation, and is prepared to assist in the establishment next year of a Swiss air mail line to connect with international services.

In an official statement issued by the Federal Air Office, it is explained that in 1920 the military authorities, realizing that a national civil aviation would he able to serve as a reserve for the nnmerically weak military air force, granted to aerial transport undertakings a subsidy of 200 francs a month for each service pilot employed. They also granted special facilties to these enterprises, and later increased the suhsidy to 300 francs.